Direct Testimony

Of

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Petition for Approval of 2014-2017 Energy Efficiency Plan

Department of Commerce and Economic Opportunity

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I. Witness Qualifications

Q. Please state your name, job title and business address.

A. My name is David Brightwell. I am an Economic Analyst in the Policy Program of the Policy Division of the Illinois Commerce Commission ("Commission"). My business address is 527 East Capitol Avenue, Springfield, Illinois 62701.

Q. Please describe your educational background.

A. I received a Ph.D. in economics from Texas A&M University in 2008. My major fields of study were industrial organization and labor economics, and my minor field was econometrics. I received a bachelor's degree in political science in 1992 and a master's degree in applied economics in 2002, both from Illinois State University.

Q. Please describe your work background.

A. I have been employed as an Economic Analyst with the Commission since June 2008. I have focused on energy efficiency and smart grid related issues at the Commission. From 2002-2008, I attended Texas A&M University, where I served as a teaching assistant or an instructor for various courses. From 2000-2002, I served as a graduate assistant for David Loomis at Illinois State University.

Q. Have you previously testified before the Commission?

A. Yes.

II. Testimony and Recommendations

Q. Please provide the purpose of your testimony and your recommendations in this proceeding.

A. The purpose of my testimony is to provide recommendations to the Commission regarding the Department of Commerce and Economic Opportunity's ("DCEO") energy efficiency ("EE") plan filing that advocates an adjusted gross method to count savings. I recommend that the Commission instead continue to use the current method of basing net savings on evaluation results.

The DCEO plan also places a substantial amount of money into a wastewater treatment program. The program is new and unproven. I recommend that the Commission order the DCEO to either: A) scale back the program funding and then only allow an allocation of additional funds if the program performs to the level at which DCEO is hoping; or B) provide the Commission with a contingency plan for spending the EE funds intended for the Wastewater Program in the event the program is not executed as intended.

I also recommend that DCEO redesign its Plan to increase the cost-effectiveness of its low income programs. The current design maximizes neither benefits nor energy savings. My recommendations will result in greater total energy savings and higher net benefits to utility customers.

Some money allocated for low income programs is proposed to be used to perform renovations on Public Housing Authority (PHA) maintenance and office facilities. I recommend that these renovations be classified as funds for government facilities rather than funds for low-income programs..

My final recommendation is to include additional information in feasibility studies required by Section 8-103A of the Illinois Public Utilities Act ("PUA"). My recommendation is to include a section I refer to as "economically efficient potential" within the feasibility studies.

III. Adjusted Gross Savings

Q. Please describe your understanding of Ms. Mrozowski's proposed adjusted gross approach to counting savings.

A. The approach proposed by DCEO is to count gross savings making only adjustments for factors such as "data errors, installation and persistence rates, and hours of use", but not making adjustments for free ridership or spillover. (DCEO Ex. 1.0, 37.) That gross savings approach is contrary to the present approach that counts only savings incremental to the efforts of the Programs. That is, net savings are calculated by using program impact evaluations that consider free ridership and spillover.

A free rider is a customer who uses program funds to complete a project that would be completed anyway. Since these projects would occur without the program, providing incentives to this customer provides no benefits. The effect of free ridership reduces measured program savings.

Spillover occurs when an energy consumer is motivated to change energy usage as a result of program actions, but the consumer does not receive funds from the EE program. Spillover may provide indirect benefits to ratepayers. The effect of spillover typically increases measured program savings.

Q. Please explain net savings and gross savings.

A. Gross savings measures the total savings that results from the measures installed through EE programs. Because of free riders, some of these savings would have occurred even if the programs did not exist. Conversely, programs may induce spillover - other changes in EE behavior through ratepayer actions that happen outside of the EE portfolios.

Net savings measures savings that occur because of EE program interventions into the marketplace. It involves multiplying gross savings by a net-to-gross ("NTG") ratio value. An NTG ratio considers the effects of free ridership and spillover to the extent practicable. An NTG ratio value is equal to 1 – the rate of free riders + the rate of spillover.

The mathematical relationship between net savings and gross savings is Net Savings = Gross Savings * (NTG ratio). In cases when the NTG ratio is equal to one, gross savings and net savings are equivalent in value.

Q. How does one determine free ridership or spillover rates?

A. It is not easy to determine free ridership or spillover rates. In the case of determining free ridership, evaluators are tasked with determining whether a customer who is enrolled in an EE program would have installed a device without a program incentive. Company and market level data on overall sales of particular equipment is proprietary and the companies who sell the equipment protect that data for fear that if competitors are able to access it, the competitors could exploit it to their advantages through pricing and marketing strategies.

As a result of the lack of access to sales and price data that could provide information about what would have happened in the absence of the program, evaluators are left with surveying program participants and vendors who ally themselves with the programs. The surveys provide information but have drawbacks in the sense that the evaluators are left asking questions to ascertain whether a customer would have purchased the equipment without a rebate or how many more sales of a particular piece of equipment a vendor sells as a result of the program. There are generally concerns about the accuracy of information received through the surveys. Evaluators attempt to remedy this by asking the same questions in several different ways and gauging the consistency of the responses throughout the survey.

Spillover is probably even more difficult to measure. By definition, spillover relates to energy use changes that result from program actions but that take place outside normal program channels. As a result, the program administrators and the evaluators may not know of the projects. The lack of awareness of these types of savings on the part of program administrators and evaluators makes it very costly and difficult to investigate and measure. Results of attempts to investigate spillover tend to be limited to certain types of actions and are often inconclusive.

Q. Given the difficulty in measuring rates of spillover and free riders, why do you recommend that the Commission reject an adjusted gross approach?

A. Despite the flaws of estimating free ridership and spillover, the information serves ratepayers better than arbitrarily choosing an NTG ratio. An arbitrarily-selected NTG ratio has no basis. The current approach at least bases savings on data collected by program evaluators and provides a more informed estimate. The adjusted gross approach is beneficial to program administrators but not to ratepayers. The adjusted gross approach rewards programs for accurately entering data and knowing how often equipment is installed but relieves them of the burden of refining the analyses to determine whether the program is providing any real benefits to the ratepayers who are ultimately providing the money for these programs. Despite the problems with measuring free ridership and spillover rates, it still provides more information than an adjusted gross approach about whether the programs are providing any real benefits to ratepayers.

Q. Please explain why examining gross benefits can lead to implementation of cost ineffective measures.

A. Consider a hypothetical measure that, if not part of an EE program, creates benefits equal to $750[1] and costs equal to $600 with respect to each customer that adopts the measure. The measure thus creates net benefits of $150 with respect to each customer that adopts the measure. Further assume that absent any incentives, 500 customers would adopt the measure creating aggregate net benefits equal to $75,000 (i.e., $150 * 500). $75,000 equals the aggregate net benefits of this hypothetical measure if it is not included in an EE program.

Now suppose this measure is made part of an EE program, that it costs $100,000 to administer, and that the incentives through the EE program (which will be discussed below) incent an additional 500 customers to adopt the measure. The program will generate an additional $75,000 of net benefits (ignoring administration costs), but will cost an additional $100,000 to administer. In sum, implementing this program creates $25,000 in net losses. This program is not cost effective and makes customers worse off.

Allowing the administrator of the EE program to claim the benefits associated with customers that would have adopted the measure without the EE program (free riders) provides a false calculus. In particular, if the administrator is permitted to claim $75,000 in net benefits that were incented by the program, plus $75,000 in net benefits that would have been realized without the program, then it

[1] Although removed for expositional simplicity, monetary values should be presumed to be expressed in present value terms.

will appear that there is a $150,000 net benefit created by the program, which will appear to exceed the implementation costs of the program by $50,000. The EE program will give the false appearance of being cost effective when, in truth, it is not.

Thus, despite the difficulty of measuring the actual impact on adoption of including a measure in a program, it is imperative that every effort be made to do so to avoid adopting programs that lead to net losses, are cost ineffective, and actually make the citizens of Illinois worse off.

Q. Given that the effects of free ridership and spillover work in opposite directions, would it be preferable to simply assume they cancel each other out and avoid the time and effort to estimate them?

A. No it is not. Ms. Mrozowski testifies that Iowa has made an assumption that if spillover were properly measured, the additional energy savings would offset free ridership. (DCEO Ex. 1.0, 36.) While simpler to assume the offset, there is no theoretical or empirical foundation. Also, assuming free riders are completely offset by spillover is likely to overestimate savings. That result is not beneficial to ratepayers, but could be advantageous for program administrators as evaluations for many programs show NTG ratio values much lower than 1.0.

For example, the residential lighting programs have estimated NTG ratio values of about 0.44. That is, 44% of the savings is estimated to occur as a result of the program and it is estimated that 56% of the savings would occur absent the existence of the program. For the Iowa assumption about spillover offsetting free riders to be correct, the lighting program must produce 1.27 times more savings indirectly through spillover than occurred directly from lighting purchases.

Q. DCEO advocates for the adjusted gross approach in part by stating that Iowa, which assumes spillover and free riders offset, and Minnesota, which claims gross savings, are among the most advanced EE programs in the country. (DCEO Ex. 1.0, 36.) What is the basis for this conclusion?

A. According to DCEO's response to Staff Data Request ("DR") DAB 1.08, these programs are considered "advanced" based on their rankings in the 2012 American Council for an Energy Efficient Economy ("ACEEE") State Energy Efficiency Scorecard Report where Minnesota ranks number 9 and Iowa ranks number 11. Additionally, the states programs are considered "advanced" on the aggressiveness of the savings targets, the duration of the programs and the fact that Minnesota has been in the Top 10 on ACEEE Scorecards for the last 6 years while Iowa has maintained the 11th position for the last two years.

Q. Can you explain the ACEEE's method for ranking states for its 2012 scorecard?

A. According to the Scorecard that DCEO submitted as part of its response to Staff DR JLH 1.02, the report "examines six of the primary policy areas in which states typically pursue energy efficiency…" "Utility and public benefits policies" are a large segment and are given a 40% weighting in the calculation. The other five areas are "transportation policies" (18%), "building energy codes" (14%), "combined heat and power policies" (10%), "state government initiatives" (14%), and "appliance and equipment efficiency standards" (4%). (ACEEE 2012 State Energy Efficiency Scorecard, pp. vi – vii, DCEO Response to Staff DR JLH 1.02.)

Q. Is there anything in the Scorecard to suggest ACEEE prefers a net savings approach in its rankings?

A. Yes. The ACEEE Scorecard indicates that states are scored on net incremental electricity savings Id at 23. To remedy the fact that some states, such as Iowa and Minnesota do not report net savings, the ACEEE Scorecard assumes a NTG ratio value of 0.9 to convert the savings from these states to net savings values. Id. at 29. The Scorecard also indicates that gross savings potentially overstate program performance. Id. at 29. The 0.9 NTG ratio applied in the Scorecard appears to be arbitrary and may overstate program performance as well.

Q. In addition to the policy implications for measuring net savings, are there legal reasons to apply net savings?

A. I am not an attorney but Sections 8-103(b) and 8-104(c) refer to annual incremental savings goals. As an economist, I understand incremental to mean savings beyond what would occur absent the EE program intervention. Net savings measures these savings while gross savings do not.

Q. What is your recommendation regarding the calculation of savings?

A. I recommend that the Commission continue to calculate net savings rather than adjusted gross savings.

IV. <u>Wastewater Treatment Programs</u>

Q. Please describe DCEO's proposed Wastewater Treatment Program.

A. According to Mr. Cuttica's testimony, the purpose of the program is to incent the purchase of High Speed Aeration Blowers and associated secondary equipment at waste water facilities. (DCEO Ex. 2.0, 23.) The Plan proposes to pay the lesser of 100% of the Turbo Blower cost or $0.36 per kWh saved. Additionally, any of the secondary measures installed may receive grants through DCEO's standard and custom programs. Id. at 23.

Q. Please describe your concerns.

A. My largest concern is that the budget for the Wastewater Treatment Program is approximately $5 million.[2] The $5 million budget is devoted to the High Speed Aeration Blowers and any secondary equipment will be incented through DCEO's standard and custom programs. Thus, more than 17.5% of the public

[2] According DCEO Ex. 2.8, 3, the annual budget is $5,555,555 per year. According DCEO Ex. 1.2, 1-3 the annual budget is $5 million.

sector electric funds are intended to incent projects in wastewater facilities.[3] While the program may turn out to be successful, at present it is unproven, and there may be various events that halt the renovations at these facilities. To the extent that these potential events come to fruition, there could be substantial money allocated to renovations that are not possible. My recommendation is for DCEO to either: A) allocate much of this money to other programs with an understanding that it can be reallocated to Waste Water facilities if the program proves to be successful; or B) provide the Commission a contingency Plan for reallocating these funds in the event that the money cannot be spent as effectively as anticipated in this Plan.

An additional concern is that the math for the incentives is not consistent with the stated intention to provide an incentive of the lesser of $0.36 per kWH saved or 100% of the Turbo Blower cost. According to DCEO Ex. 2.8, the projected incentives are $4,599,999 per year and estimated energy savings are 11,493 MWH per year. This amounts to about $0.40 per kWh.[4] I recommend that DCEO reconcile this discrepancy.

[3] The public sector electric budget is between $28 and $29 million depending on the Plan Year. $5 million is 17.5% of $28.5 million. This represents the lower bound for spending as the incentives for secondary equipment are not included in the information for this program. Therefore, more than 17.5% of the public sector electric budget is intended for Wastewater facilities.

[4] 4,599,999/11493 = $400 per MWH which is equivalent to $0.40 per kWh.

V. Low Income

A. Public Housing Office and Maintenance Facilities

Q. You earlier stated that DCEO intends to spend money allocated for low income customers to complete EE improvements on Public Housing Authority office and maintenance facilities. What is the basis for this statement?

A. This is based on Mr. David Baker's direct testimony and a Data Request response by Mr. Baker (DCEO Ex. 3.0, 16; Response to Staff DR DAB 1.02.). In Mr. Baker's testimony he states that administrative and maintenance buildings are included in the targeting. The Data Request response states that doing so is administratively convenient for DCEO.

Q. Why do you recommend that this money be allocated to government facilities instead?

A. I am not an attorney but based on my understanding of Sections 8-103 and 8-104 of the PUA, DCEO is required to allocate certain percentages to low income customers and that programs designed for low income customers are not required to meet cost-effectiveness as the term is defined in these statutes. However, public sector projects are required to be cost-effective.

Since PHAs are not low income customers, money allocated for their office and maintenance facilities renovations are incorrectly being allocated. Additionally, to the extent that cost-ineffective measures are being installed in PHA facilities, the cost-effectiveness of the government sector programs is unlikely to account for it. Therefore I recommend that the Commission require DCEO to correctly allocate expenditures, savings, and cost-effectiveness of PHA facility investments to its government sector programs.

B. Raising Cost-Effectiveness of Low Income Programs

Q. You also stated that DCEO cost-effectiveness could be increased in the low-income programs. Please explain this.

A. The objective of the low income programs is to put the most energy efficient equipment possible into each residence where renovations occur. The rationale for doing so is that there is usually only one opportunity to complete these projects and that getting as much savings as possible from each project serves the interests of ratepayers and taxpayers by decreasing the funds paid to low income customers through the Illinois Home Weatherization Assistance Program, through the Low Income Home Energy Assistance Program, or through federal grants to PHAs through the U.S. Department of Public Housing and Urban Development. Since there is only one opportunity, DCEO also believes that the goal of reducing the payments to these customers through the various state and federal funding sources mentioned above justifies inclusion of cost-ineffective measures at the time these renovations take place (DCEO Ex. 3.0, 7-8.)

Q. Do you have concerns about this approach?

Yes. I refer to this as a “good of the few approach” because the logic behind the approach ignores that there are often costs of increasing the efficiency level of measures that are extremely disproportionate to the costs of the increased savings that result. As such, maximizing the savings achievable by any one facility ignores all the lost savings that are possible in other facilities if the money is instead distributed to increase the number of facilities in which projects occur. That is, the programs are designed to benefit fewer customers and result in lesser total energy savings than if the programs were instead designed to provide lower savings per facility and increase the total number of facilities where savings take place. By designing the programs to benefit fewer low income customers, DCEO is not minimizing the total payments that ratepayers and taxpayers pay to assist low income customers.

The rationale to include cost-ineffective measures in these residences for purposes of lower payments made by taxpayers through the state and federal assistance programs is also based on faulty logic. The Total Resource Cost Test used to measure cost effectiveness in Illinois includes as benefits the net present value of the gas and electric savings over the expected life of a measure and compares it to the cost to obtain these savings. If a measure is not cost-effective, it means that costs of the equipment are greater than the value of the gas and electric that is saved. That is, by DCEO’s rationale, if it costs ratepayers and taxpayers $100 to install a piece of equipment that saves gas and electric valued at $90, then it is justified to do so because the taxpayers and ratepayers avoid paying $90 in LIHEAP and IHWAP payments. It glosses over the fact that these taxpayers and ratepayers just paid $100 so they could avoid paying $90.

Q. Sections 8-103 and 8-104 of the PUA state that low income measures are not required to pass the Total Resource Cost ("TRC") Test. Please explain why you believe DCEO should minimize the number of cost-ineffective measures.

A. I am not an attorney but I suspect the reason involves a difference in the TRC analysis of what the costs are for low income and non-low income customers. The cost for some low income measures is higher than if the same measure were installed for a non-low income customer. Because of this difference in the measurement of cost, I suspect that there was a concern that low-income households may not be eligible for some measures for which non-low-income households would be eligible. The difference in the measurement of costs may make it reasonable to permit cost-ineffective measures in low income programs.

DCEO's approach seems to be that because low income measures are not subject to passing the TRC Test, it is acceptable and sound policy to add cost-ineffective measures even if the measures would not pass the screen for non-low income households. This is more extreme than I suspect is the intent of the statutes. It certainly is not in the best interest of ratepayers to add measures that wouldn't be added in other households.

Q. Provide an example of how the costs are calculated differently.

A. As part of DCEO's Public Housing Authority program, DCEO is replacing old inefficient central air conditioners and furnaces. The assumption is that these customers would not replace the air conditioners unless the full replacement cost is paid. As a result, the full cost of replacing the central air conditioners and furnaces is used as the incremental cost of replacement and is compared to the incremental value of the savings between the new equipment and the efficient equipment.

If a non-low income household were to replace an old furnace or AC unit, it is assumed that the household was in the market to replace the unit with some type of more efficient unit. As such, the household would have to pay at least the cost of the minimum efficient furnace or AC. The cost used in the TRC Test is not the full cost of the EE unit. It is only the difference in cost between the EE unit and the unit that would be purchased as the alternative.

Since the benefits are approximately the same but the costs are substantially greater in the low income analysis, requiring low income measures to pass the TRC Test would severely limit the number of measures for which low income households would be eligible.

Q. What do you recommend?

A. I recommend that DCEO be allowed to employ cost-ineffective measures but that any cost-ineffective measures should be scrutinized to determine whether the measures are not cost-effective for any income class or merely for low-income customers.

Q. Provide an example of how maximizing savings per residence can sacrifice enough projects to lower the overall total savings that is achievable for a given budget.

A. A comparison of 92% and 95% Annual Fuel Utilization Efficiency ("AFUE") furnaces illustrates this point. According to DCEO's cost-effectiveness analysis, the baseline assumed for replacing a furnace in a PHA is a 70% AFUE furnace. The assumed cost to replace a 70% AFUE furnace with a 95% AFUE furnace is $3600. DCEO did not provide an analysis of the 92% AFUE furnace, presumably, because it does not intend to install 92% furnaces. The Statewide Technical Reference Manual assumes the cost of a 95% AFUE furnace is $3449 or 4% less than the $3600 cost assumed by DCEO. The TRM assumes the cost of a 92% AFUE furnace costs $2813. Increasing this cost by 4% to be consistent with DCEO's markup for the 95% furnace results in a cost of $2936 for the 92% furnace.

The TRM estimates that 92% furnace saves 275 therms per year when compared to a 70% AFUE furnace installed in Chicago.[5] The 95% furnace is estimated to save 303 therms per year in Chicago.

[5] The formula for estimating furnace savings is weather dependent. The TRM provides Heating Degree Days for five zones in Illinois. Chicago is the second coldest zone and will result in greater estimated savings than if the statewide average Heating Degree Days are used.

The difference in savings between a 92% and 95% furnace is $664. The difference in savings is 28 therms per year. Thus increasing the efficiency a furnace from 92% to 95% is equivalent to paying $23.71 per first-year therm saved. According to DCEO's cost-effectiveness analysis, it intends to install 144 95% furnaces across the state.[6] The incentive cost is $518,000 ($3600 per unit*144 units). For $518,000, DCEO could instead install 176 92% AFUE furnaces ($518,000/$2936 = 176.5) and have $1264 remaining to use for installing other measures. Using the estimated savings from Chicago, 144 95% furnaces save 43,632 therms per year. One hundred seventy-six 92% furnaces save 48,400 therms per year. Thus, installing 95% furnaces instead of 92% furnaces reduces the number of units installed by 32 (176 – 144) and reduces total savings by 4768 therms per year.

I refer to this as "taking a good of the few" approach because the savings per unit are higher and each of the low income customers helped receives greater assistance through this approach. However, this approach overlooks the fact that fewer units can be installed and less total assistance is being provided to low income customers.

The "good of the many" approach would use energy efficient but not top-of-the-line efficient equipment when the additional costs of top-of-the-line equipment increase disproportionately with increases in energy savings. This approach helps

[6] Fifty furnaces in Ameren's territory and 94 combined in the Nicor and Integrys territories.

more low income customers and produces greater total energy savings. Under DCEO's argument that installing measures in low-income households when the opportunity presents itself is beneficial to taxpayers because it reduces payments needed by LIHEAP and other programs, the "good of the many approach" saves more energy which in turns reduces contributions to energy payments by ratepayers and taxpayers.

Q. What do you recommend?

A. I recommend that DCEO reconfigure its Plan to account for additional savings opportunities that can occur by lowering the per facility savings and increasing the number of facilities that are served. This approach is more beneficial to ratepayers and low income households. It also increases the cost-effectiveness of DCEO's low income programs.

VI. Feasibility Studies

Q. You mentioned supplementing the potential studies with an analysis of economically efficient potential. Please explain.

A. The potential study presented by DCEO measures what it refers to as technical potential and economic potential.[7] Technical potential essentially

[7] DCEO provided a potential study with its testimony but it is not identified with an exhibit number. For purposes of citation I refer to it as DCEO Ex. PS.

measures how much savings could be realized if all energy using equipment was replaced with the most energy efficient technology available. (DCEO Ex. PS, 4.) Economic potential as used in the Potential Study measures the amount of savings possible from using the most technologically efficient replacement equipment that is considered cost-effective. The concern that I have is that this definition of economic potential is equivalent to asking "What is the potential energy savings from replacing current equipment with the most energy efficient piece of equipment that still provides net benefits to customers?" It doesn't answer the question, "What is the potential energy savings if current equipment is replaced with the efficient equipment that maximizes net benefits to ratepayers?" The answer to the latter question will quite often indicate which level of efficiency results in the highest attainable energy savings for a given budget.

Q. How do you propose to measure economically efficient potential?

A. The concept economists use to measure economic efficiency is called marginal analysis. In the context of the potential studies, one would apply it by ranking equipment in degree of energy efficiency relative to the current stock of equipment from the lowest to the highest. Once the ranking is done, one would examine the additional benefits and additional costs of moving from the current equipment to the piece of equipment that is slightly higher. Then one would do this again comparing the additional costs and benefits from the next highest piece of equipment to the previously used more efficient equipment. This process is repeated until the additional benefits of the next highest piece of equipment are less than the additional costs of that piece of equipment.

Q. Please provide an example.

A. The example of the 92% and 95% AFUE furnaces in my above testimony is essentially marginal analysis. The analysis did not compare costs and benefits for each level of efficiency between 90% AFUE and 95% AFUE but showed that the additional savings from a 95% AFUE furnace compared to a 92% AFUE furnace was 28 therms per year while the additional cost is $664. The exact efficiency at which net benefits are maximized was not shown in this example but the principle of how to apply marginal analysis and the benefits of marginal analysis are shown.

Q. Does this conclude your prepared direct testimony?

A. Yes.